

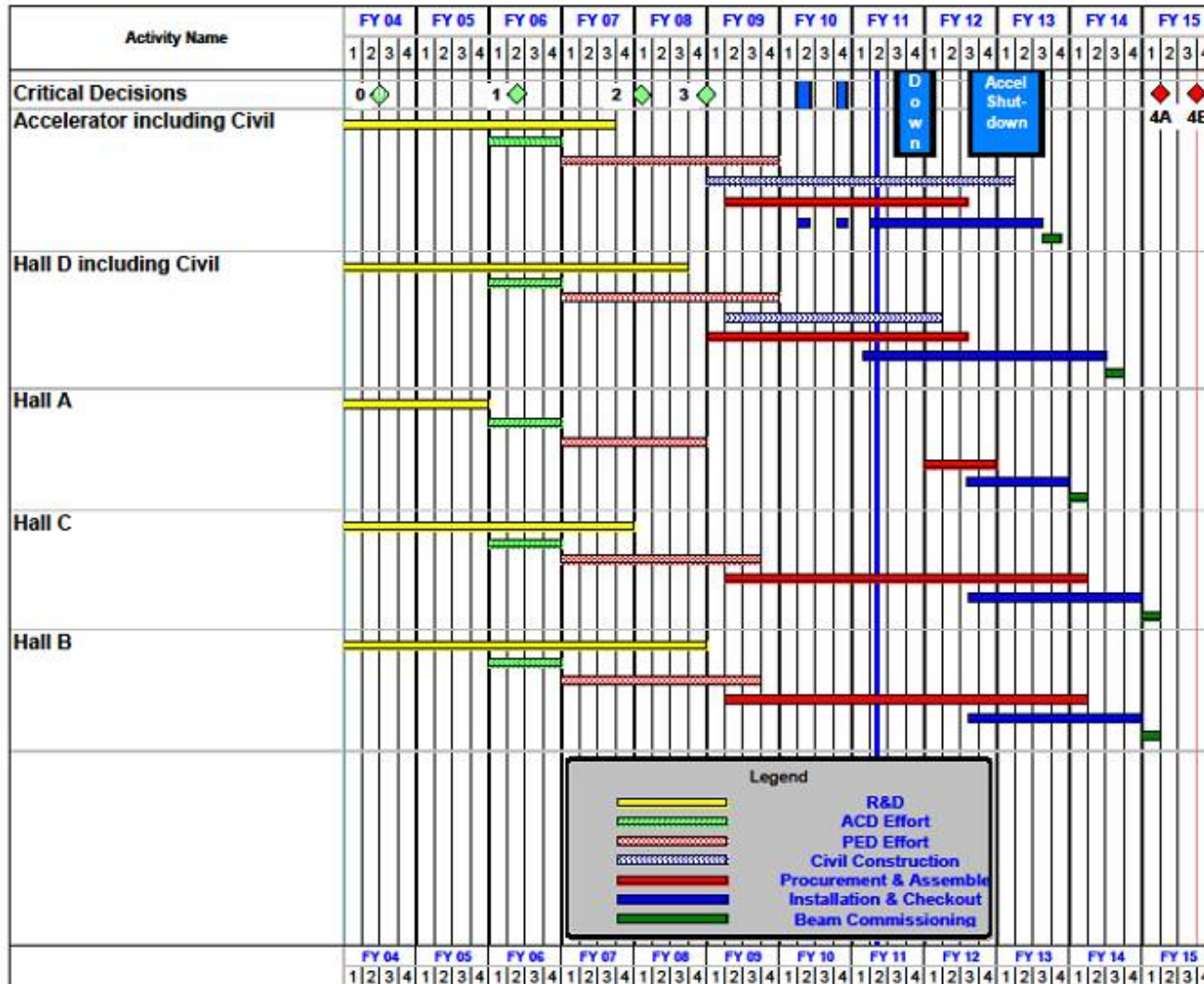
Installing and scheduling Hall B experiments in the 12 GeV era

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Jefferson Lab

Disclaimer

- Everything I will be saying about scheduling may be subject to change.

12 GeV Upgrade Schedule



Two short parasitic installation periods in FY10

6-month installation
May – Oct 2011

12-month installation
May 2012 – May 2013

Hall A commissioning start
October 2013

Hall D commissioning start
April 2014

Halls B/C commissioning start
October 2014

Project Completion
June 2015

CEBAF Operation Model 1

Arne Freyberger
January 7, 2011

Constant Effort Table

	FY12	FY13	FY14	FY15	FY16	FY17
12GeV Pre-ops		5	3.5	3	0	0
Support Pre-ops		2	5	4	0	0
Machine Development		4	26.5	6	8	0
Research Weeks	27	0	0	9	18	27
Hall Weeks	63.18	0	0	9	36	66.15
Total Operating Weeks	27	11	35	22	26	27
Hall Multiplicity	2.34	0	0	1	2	2.45
CEBAF Reliability Goal	89%	50%	65%	70%	75%	80%

Note: Steady state operation of 27 weeks at 2.45 Hall multiplicity translates into **116 days** of operation for each Hall. At 50% overall efficiency this translates into **58 PAC days** of running per year (compared to ~105 PAC days in the 6 GeV era).

CEBAF Operation Model 2

Arne Freyberger
January 7, 2011

Proposed Table

	FY12	FY13	FY14	FY15	FY16	FY17
12GeV Pre-ops		5	3.5	3	0	0
Support Pre-ops		2	5	4	0	0
Machine Development		4	26.5	6	8	0
Research Weeks	27	0	0	9	27	35
Hall Weeks	63.18	0	0	9	67.5	101.5
Total Operating Weeks	27	11	35	22	35	35
Hall Multiplicity	2.34	0	0	1	2.5	2.9
CEBAF Reliability Goal	89%	50%	65%	73%	80%	85%

Note: Steady state operation of 35 weeks at 2.9 Hall multiplicity translates into 178 days of operation for Hall B. At 50% efficiency this translates into 89 PAC days of running per year (compared to ~105 PAC days in the 6 GeV era).

Assumptions

- CLAS6 removal begins as scheduled 05/2012
- CLAS12 installation & checkout complete 09/2014
- CLAS12 commissioning begins 10/2014
- Hall B operation for physics begins 07/2015
- CEBAF12 annual steady state operation 245 days
- Max. # Halls receiving beams simultaneously 3
- # Halls operational 4
- Hall multiplicity (steady state operation) 2.9
- # days with beam in Hall B = $245 * 2.9 / 4$ 178
- Efficiency = Hall B DAQ uptime/elapsed time 0.5^{*)}
- Approved PAC days for annual running 89

^{*)} Based on past experience from running experiments in 6 GeV era.

CLAS removal and **CLAS12** installation

Remove Structures
and other Detectors

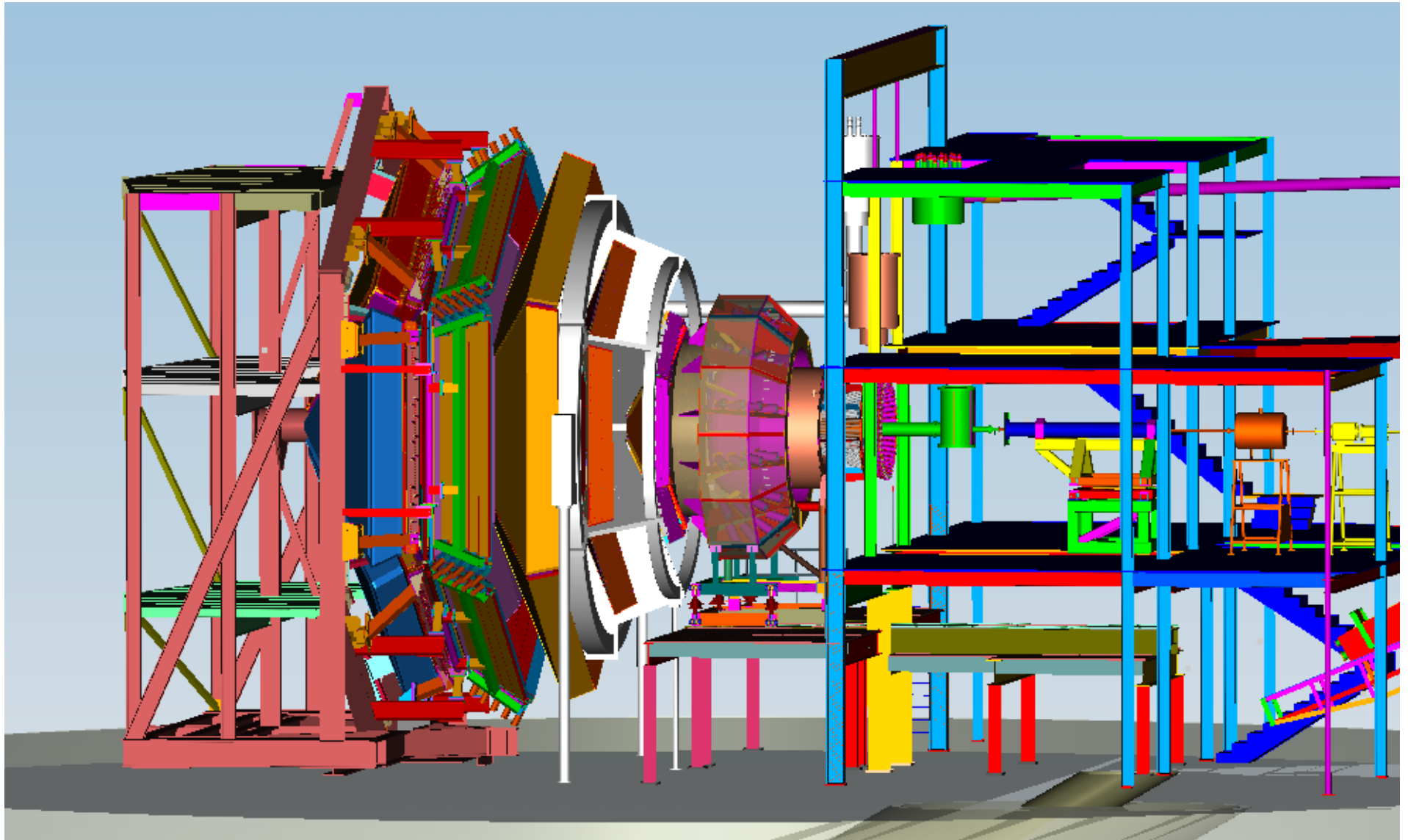


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Full *CLAS12* Assembly in Hall B

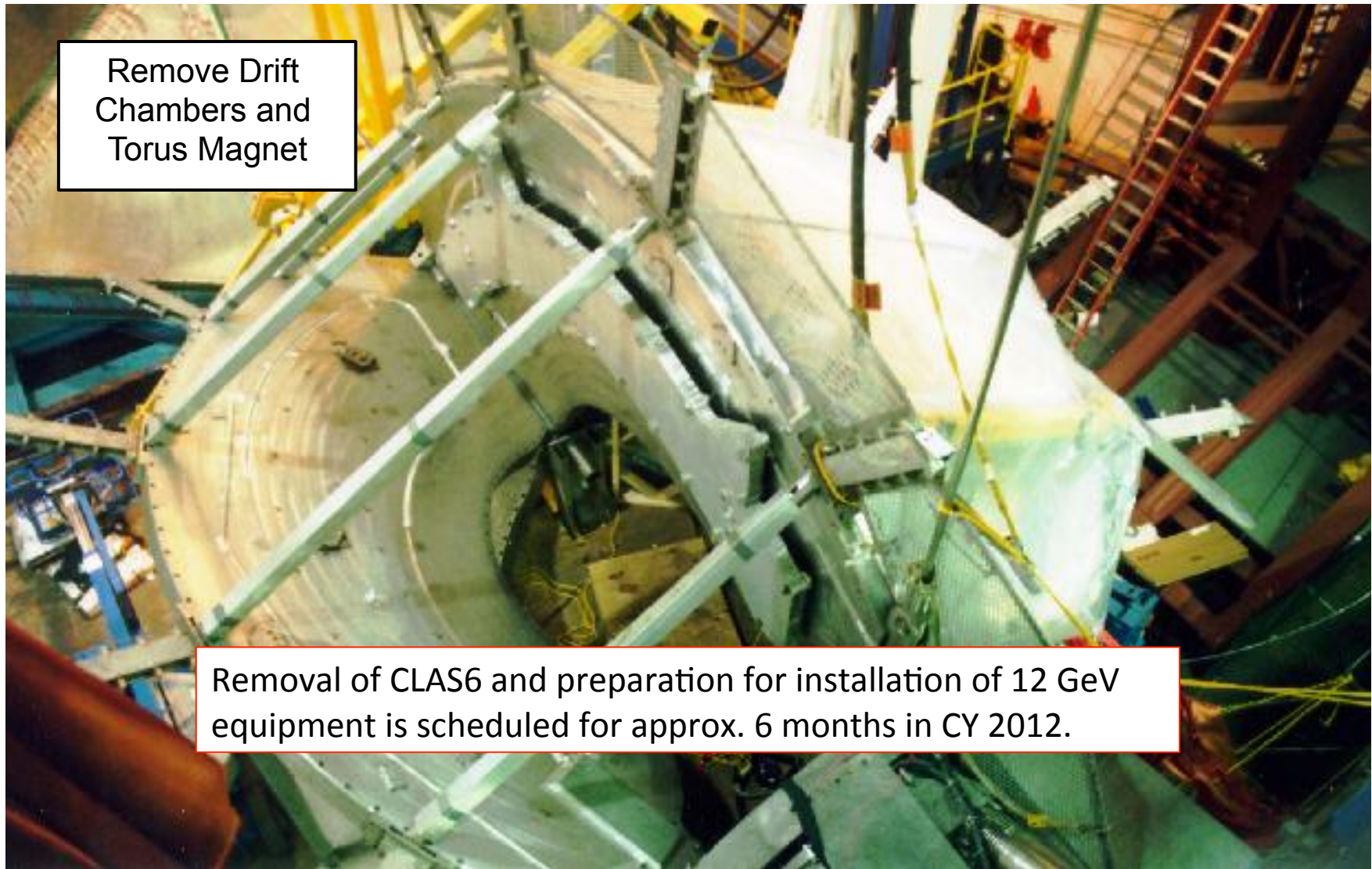


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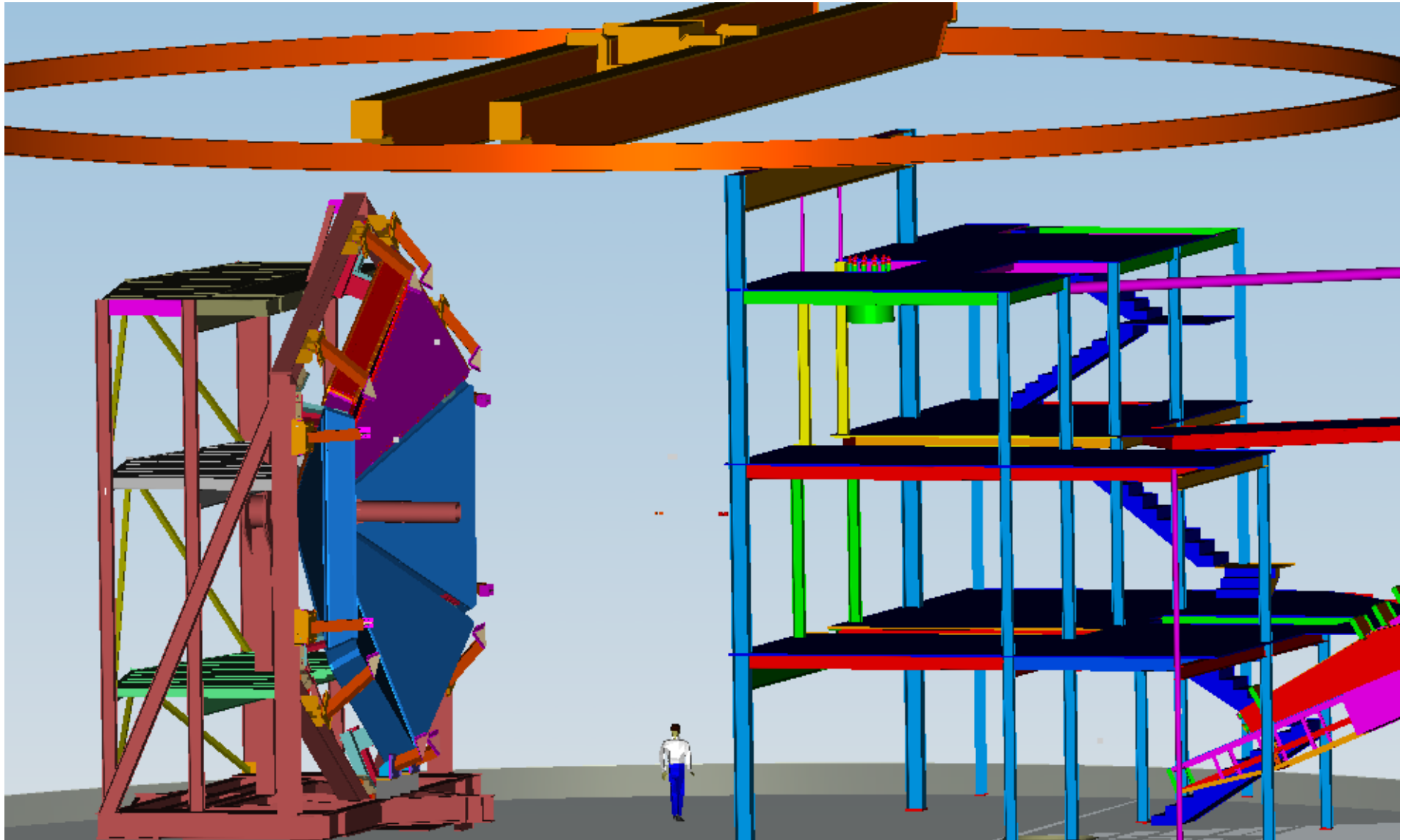
HPS Collaboration Meeting May 26-27, 2011

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How do we get there?



Hall B Prepared for *CLAS12* Installation

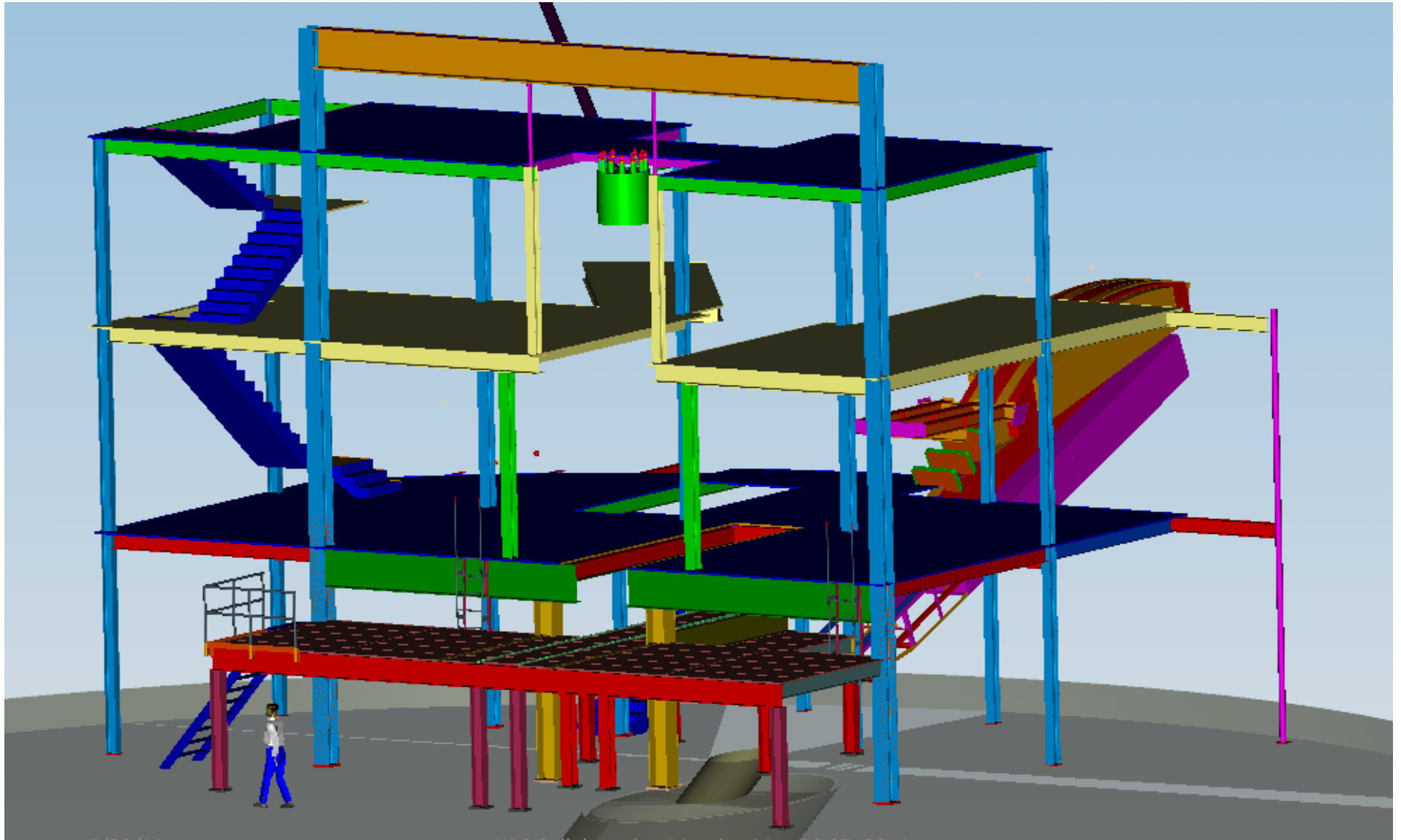


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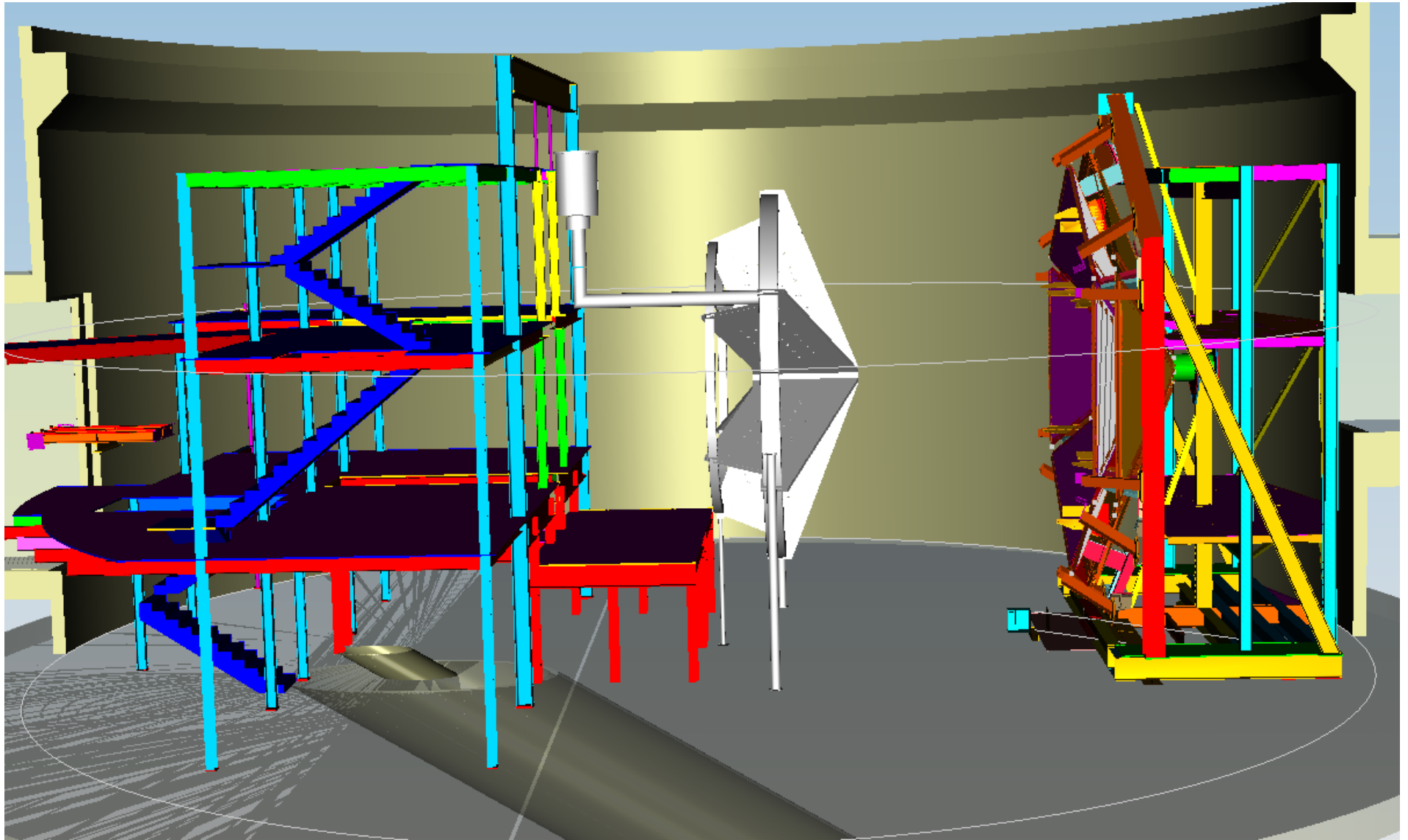
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Subway level added



CLAS12 TORUS Assembly

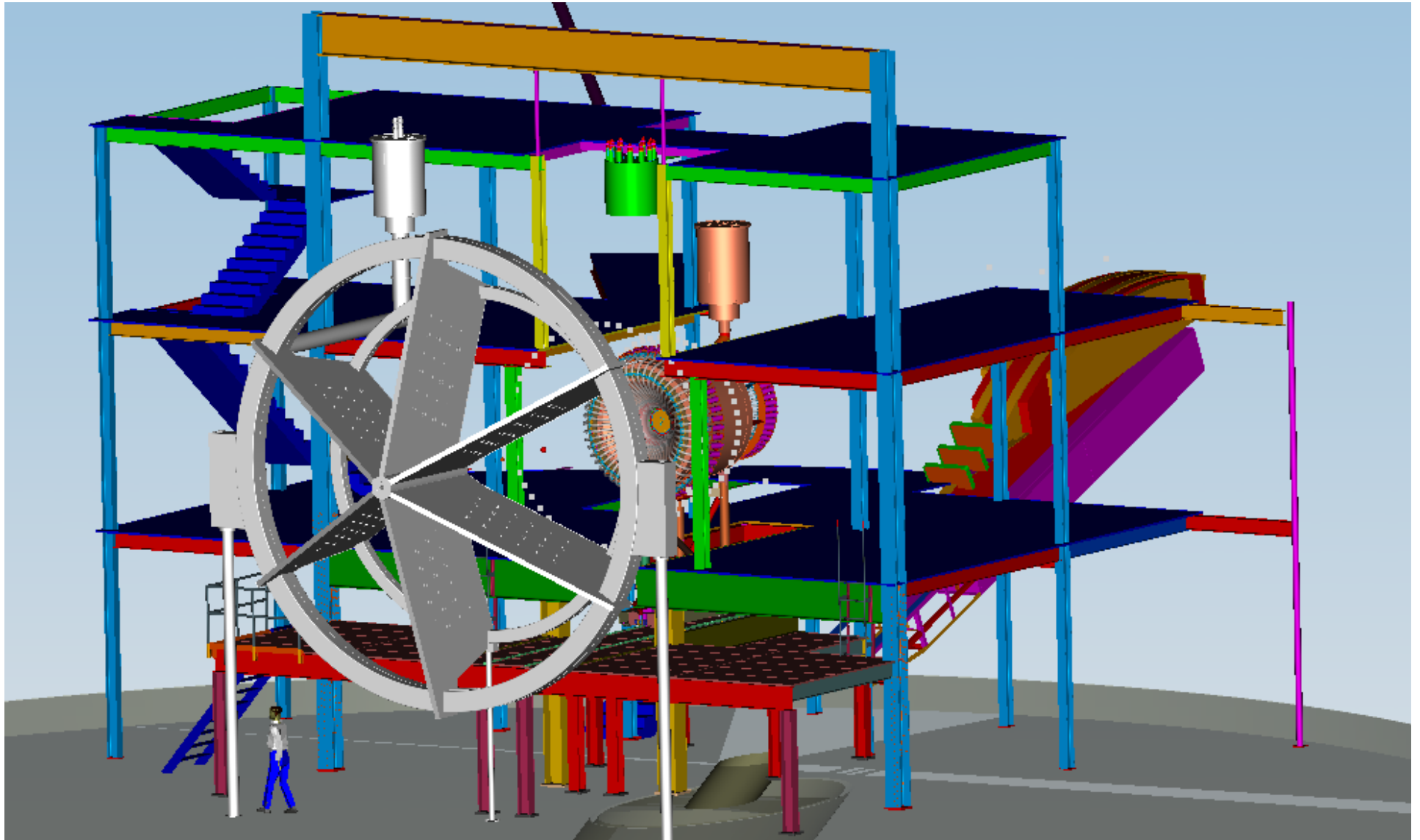


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Central Detector added

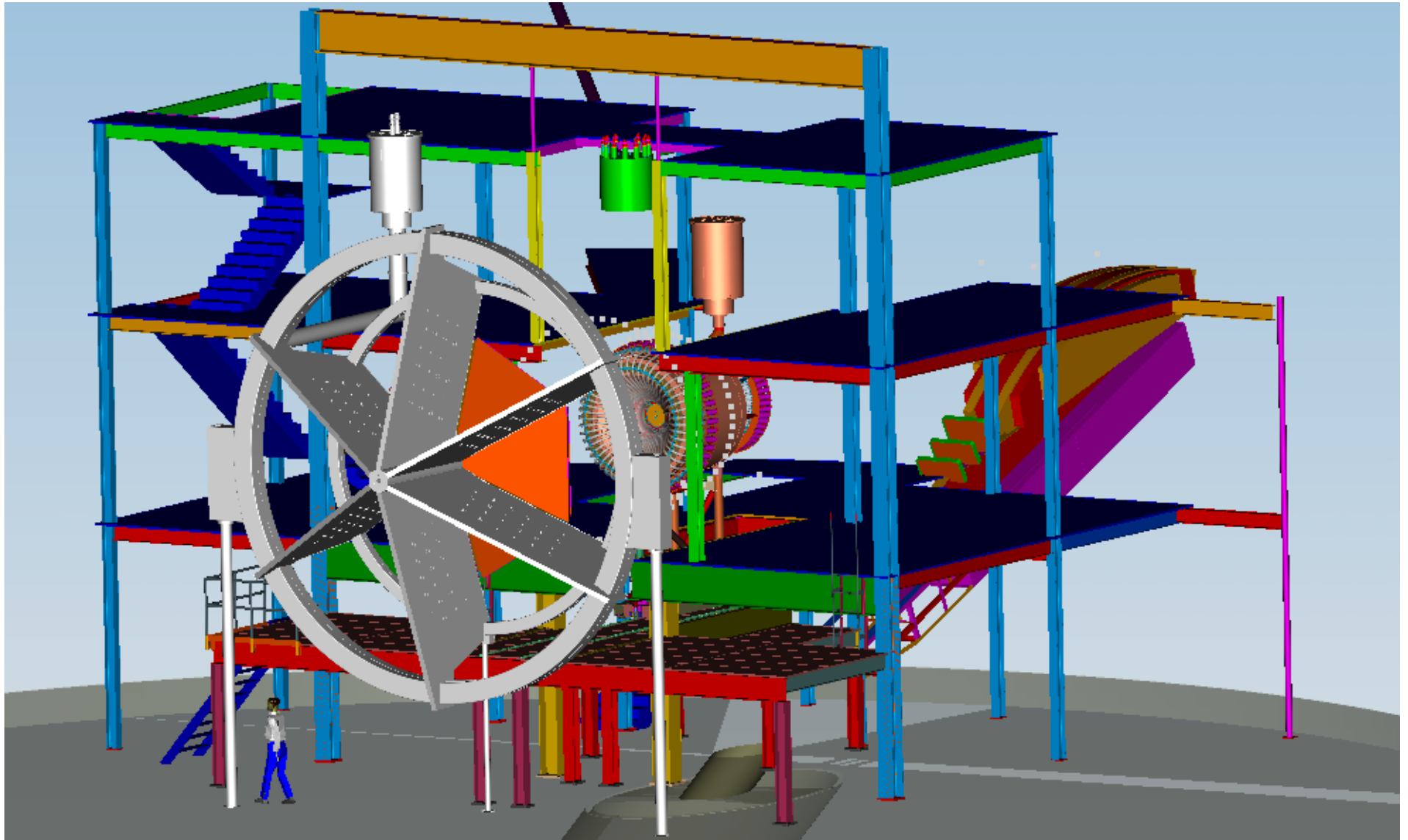


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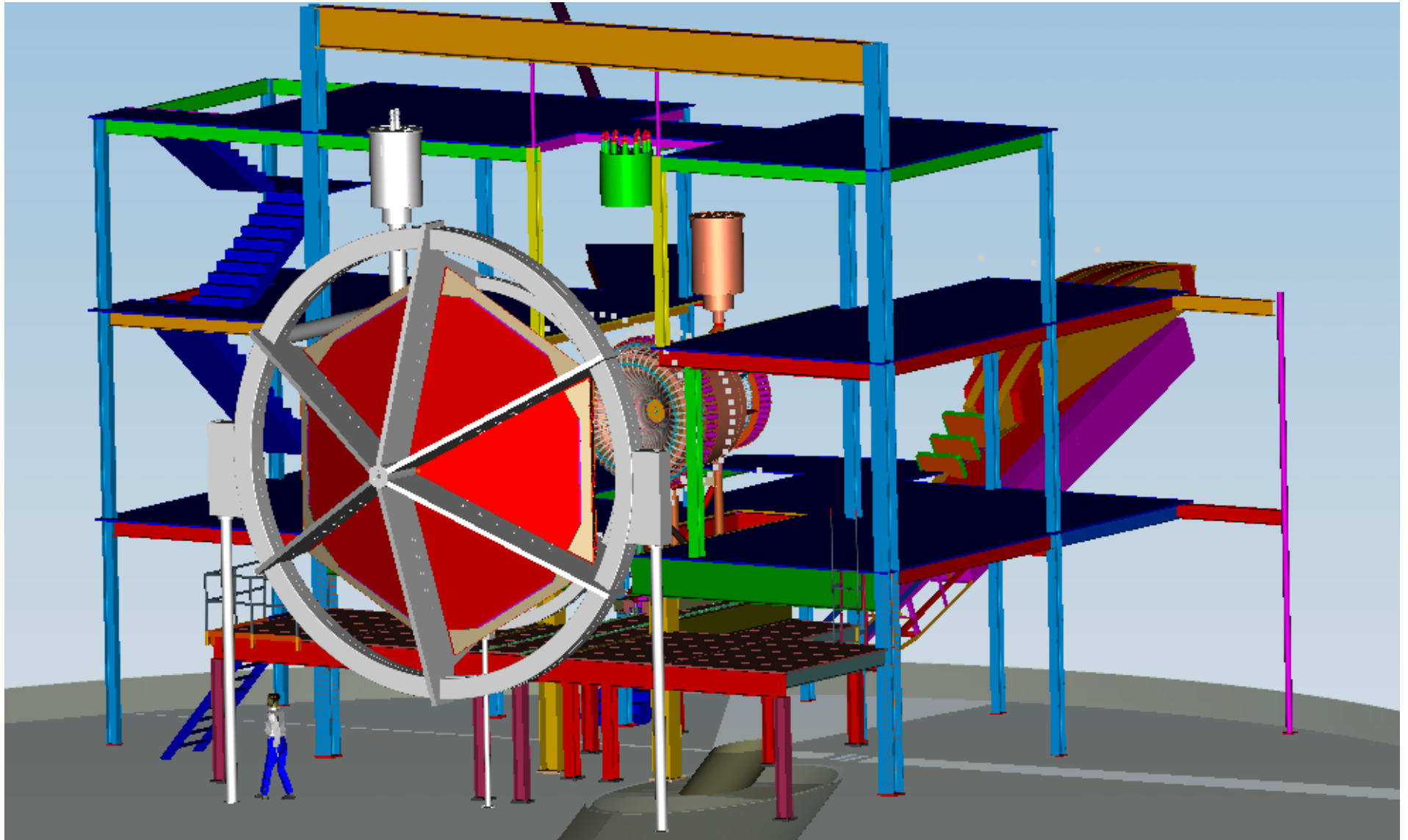
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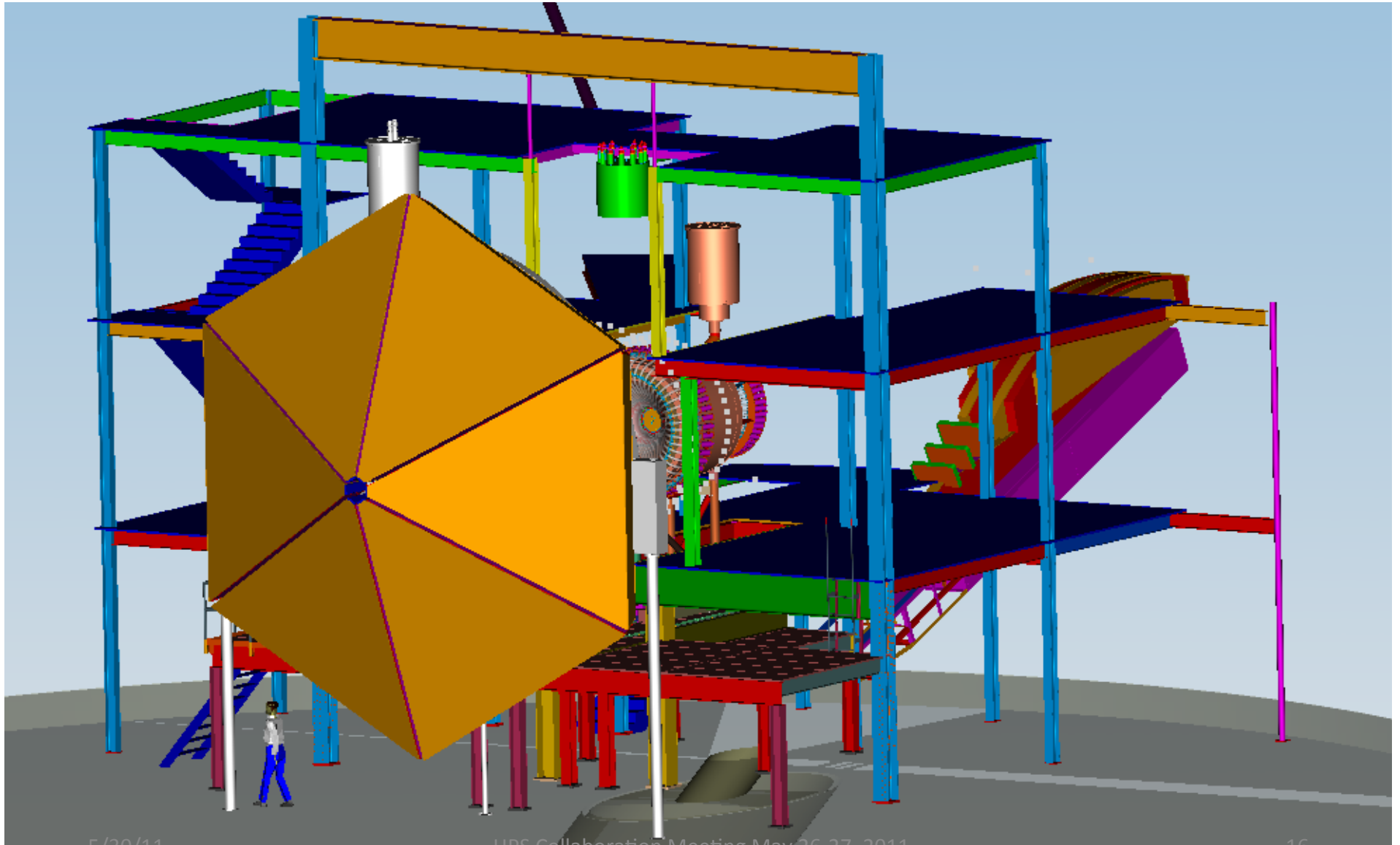
Install DC Region 1



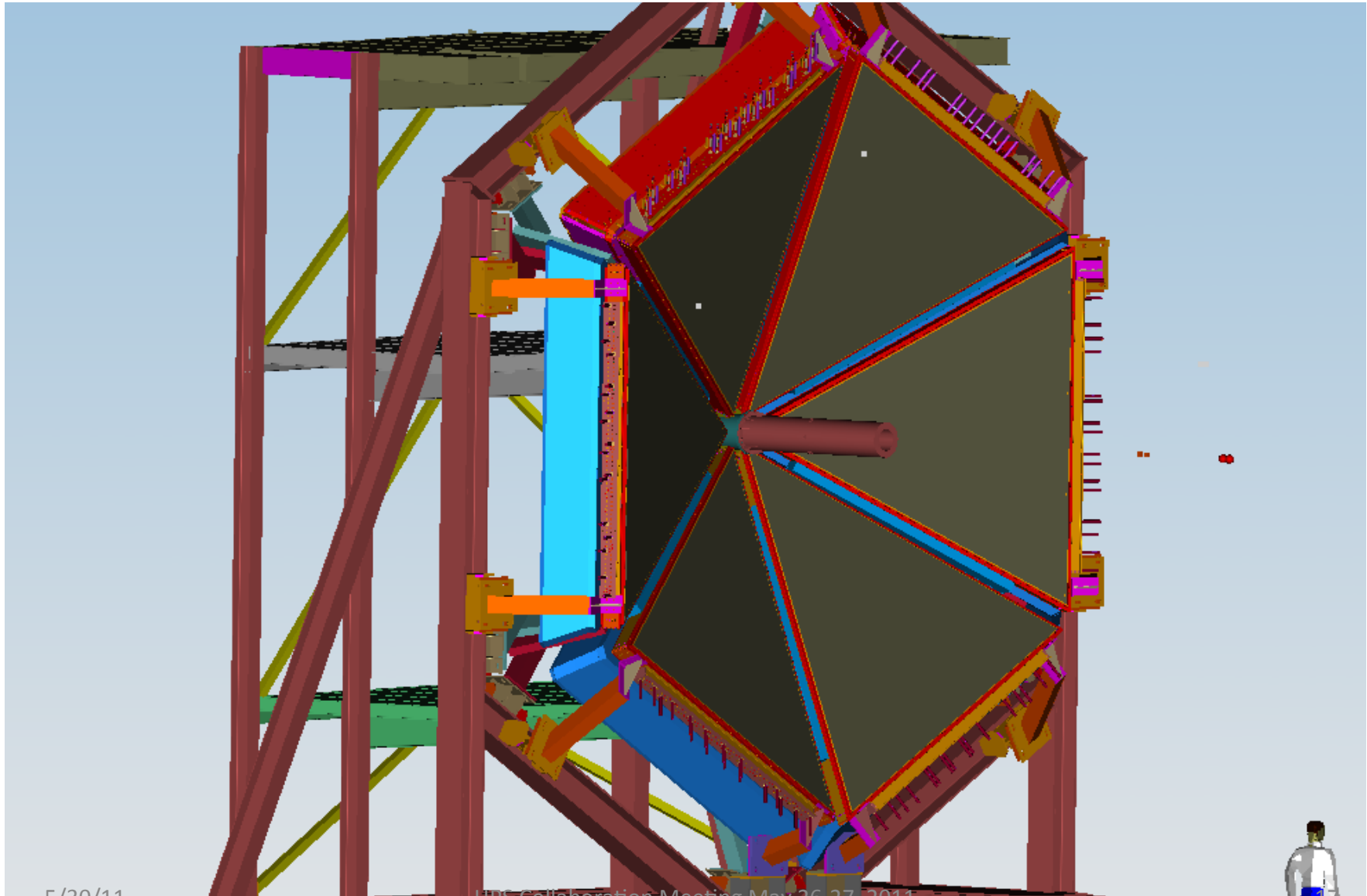
DC Region 2



DC Region 3



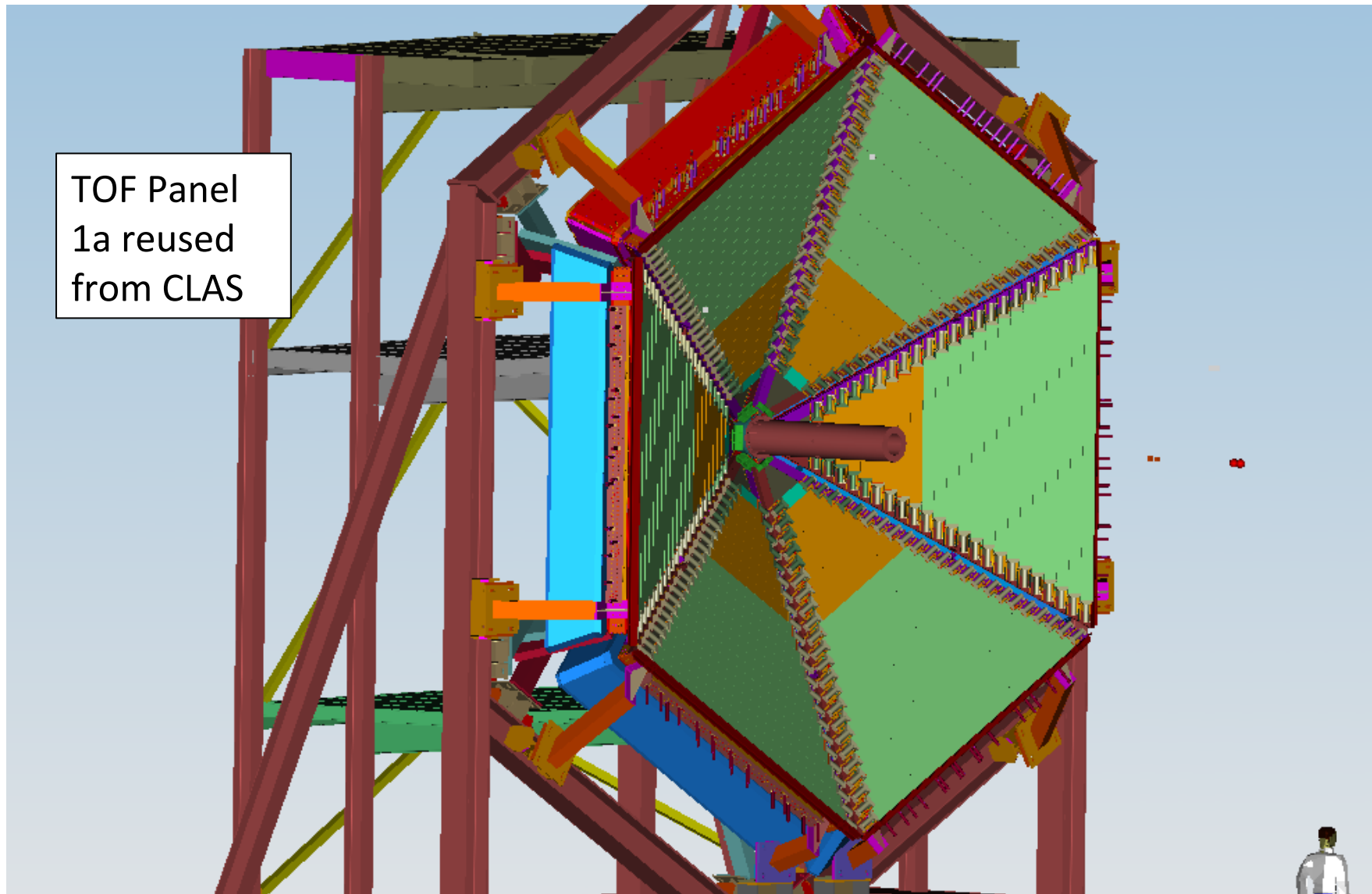
EC and PCAL on the Forward Carriage



5/30/11

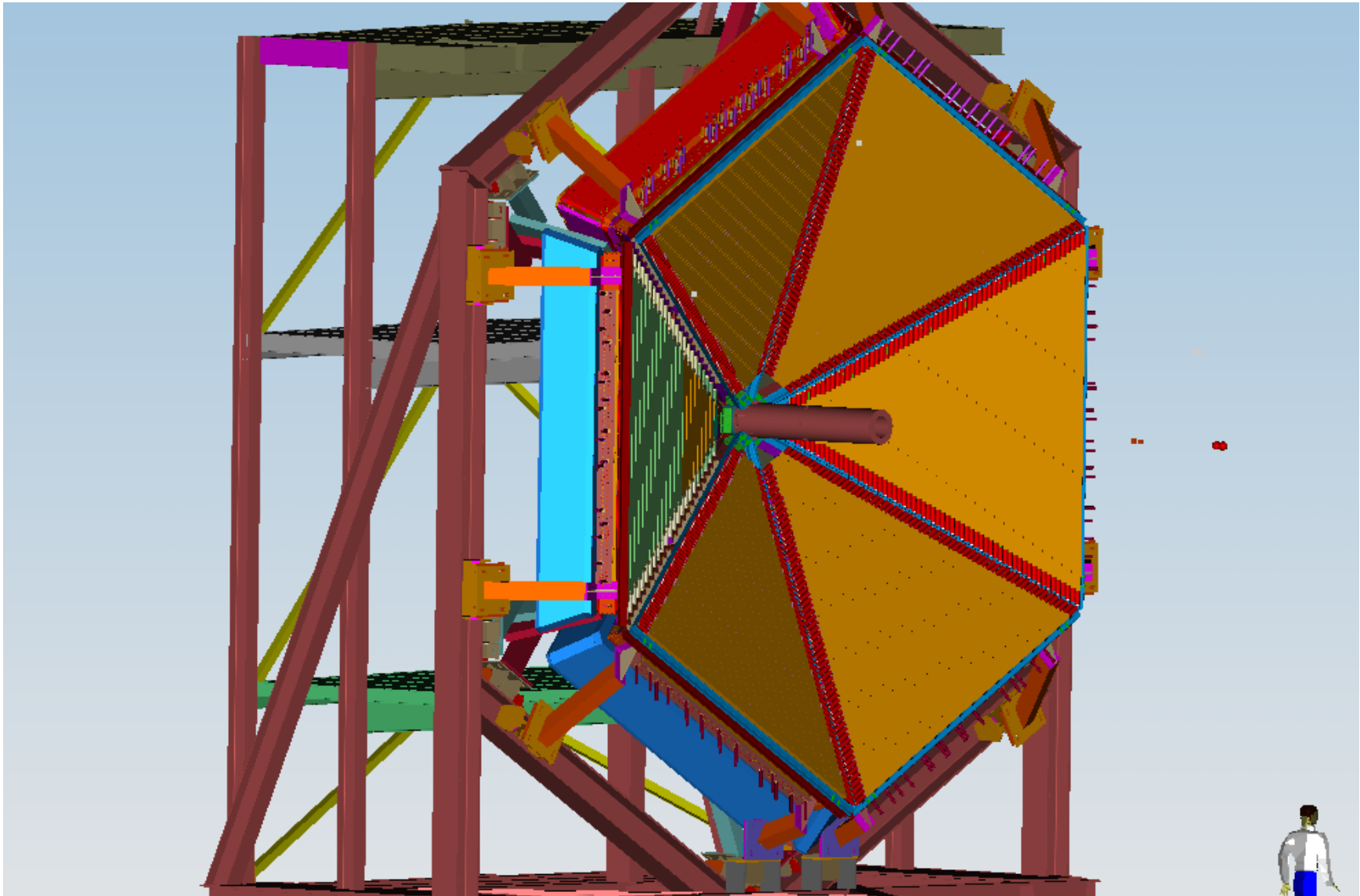
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Forward TOF placed over PCAL



TOF Panel
1a reused
from CLAS

High resolution FTOF 1b added



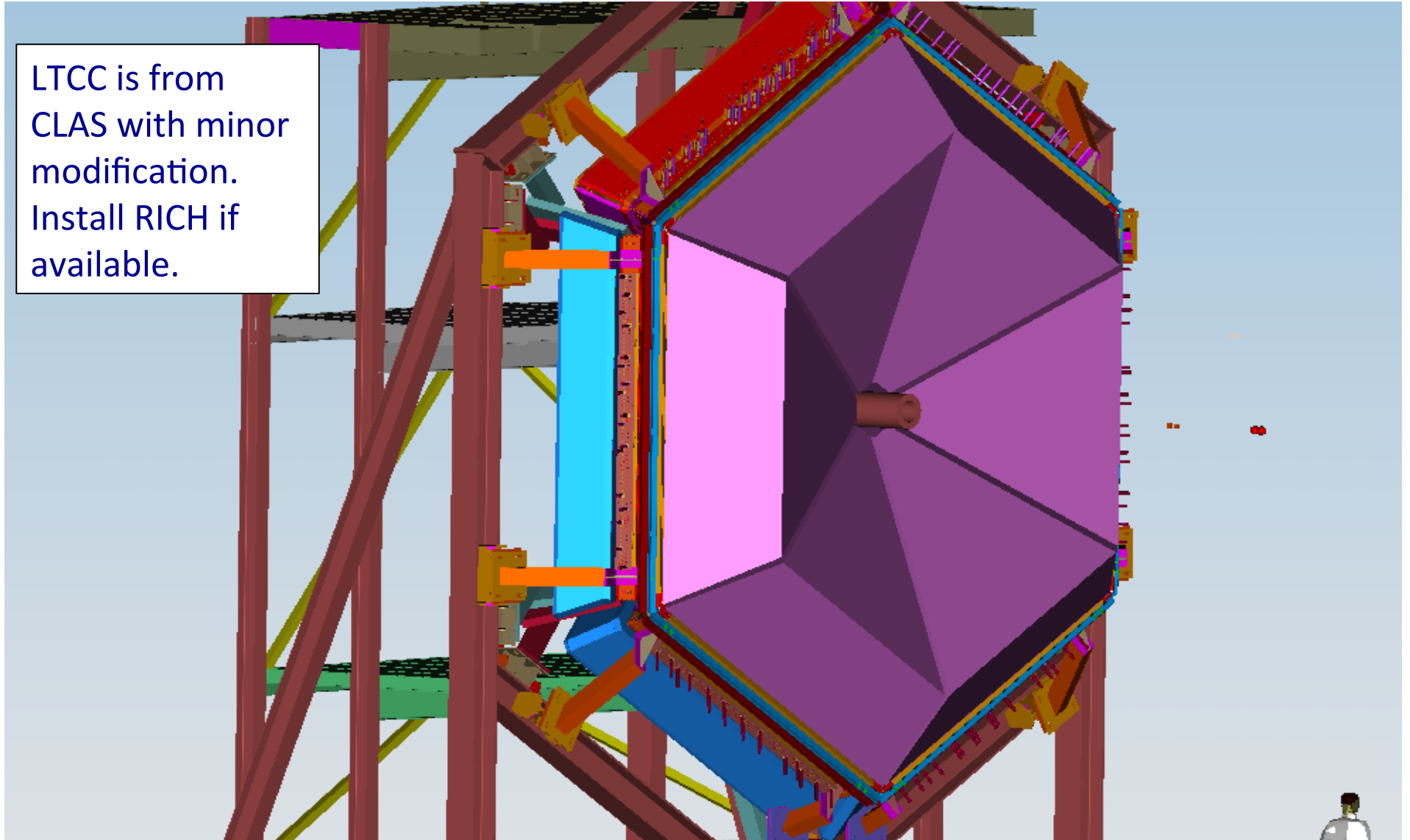
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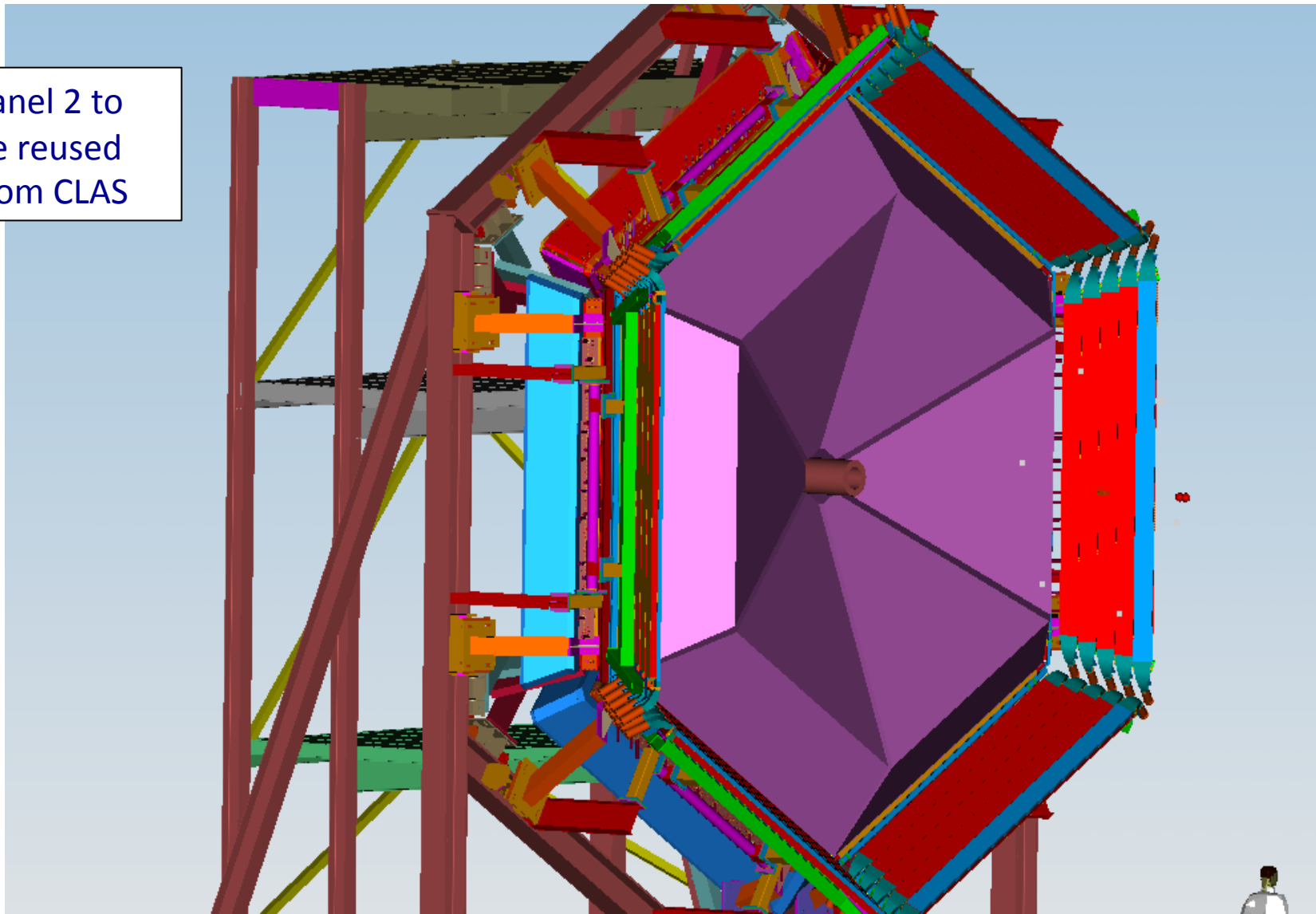
Low Threshold CC (LTCC) installed

LTCC is from CLAS with minor modification. Install RICH if available.

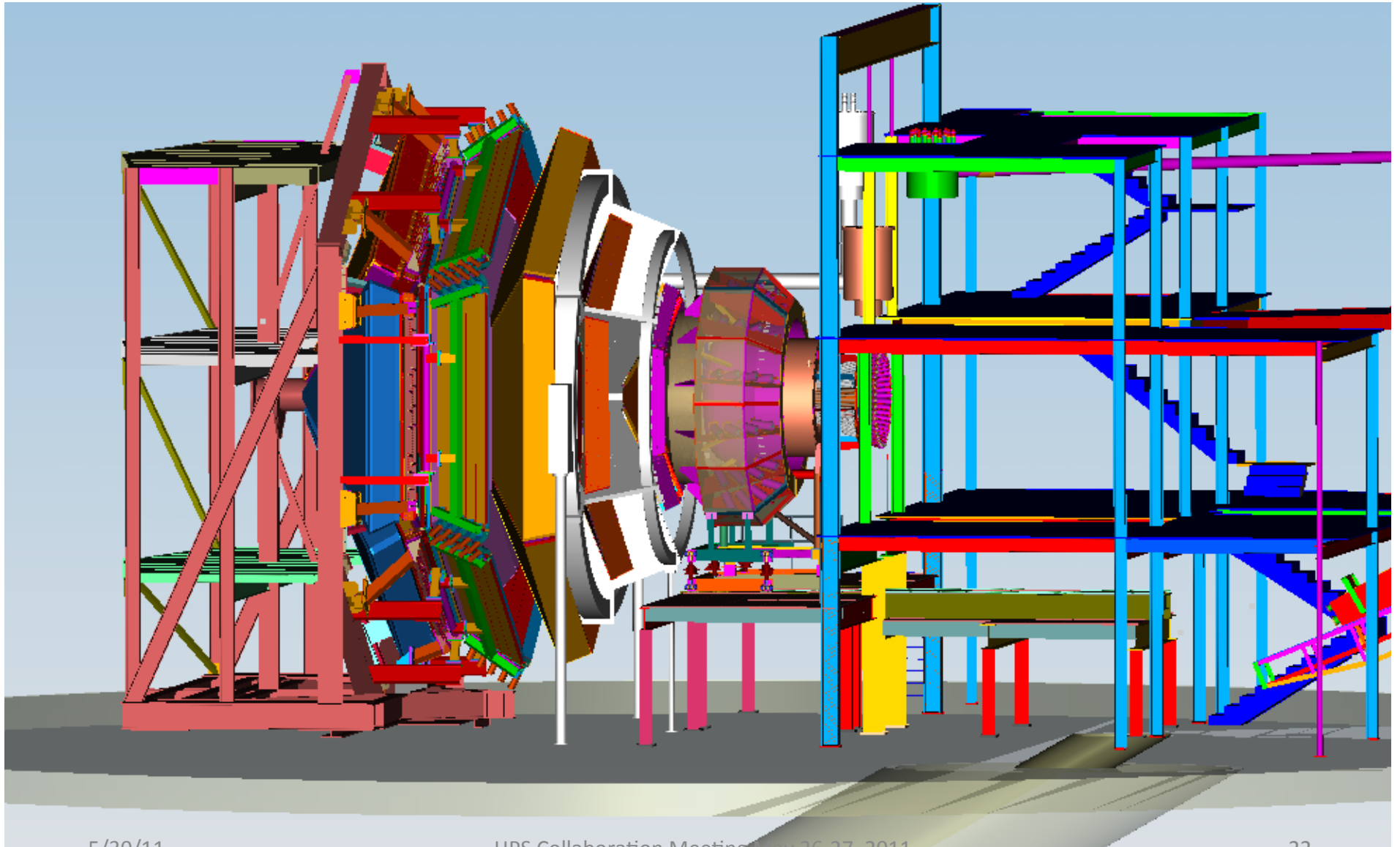


Forward TOF Panel 2 added

Panel 2 to
be reused
from CLAS

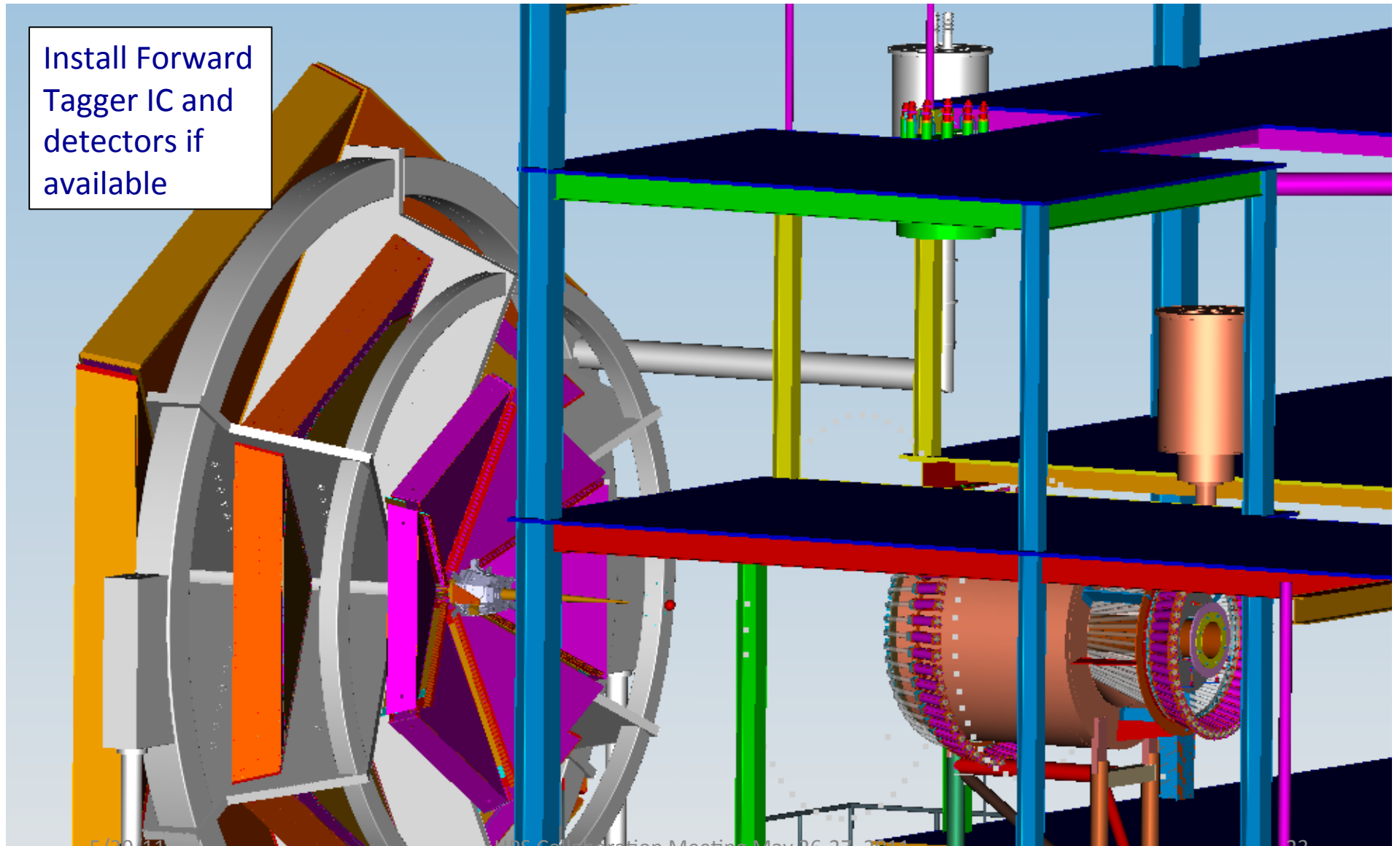


Install High Threshold CC (HTCC)

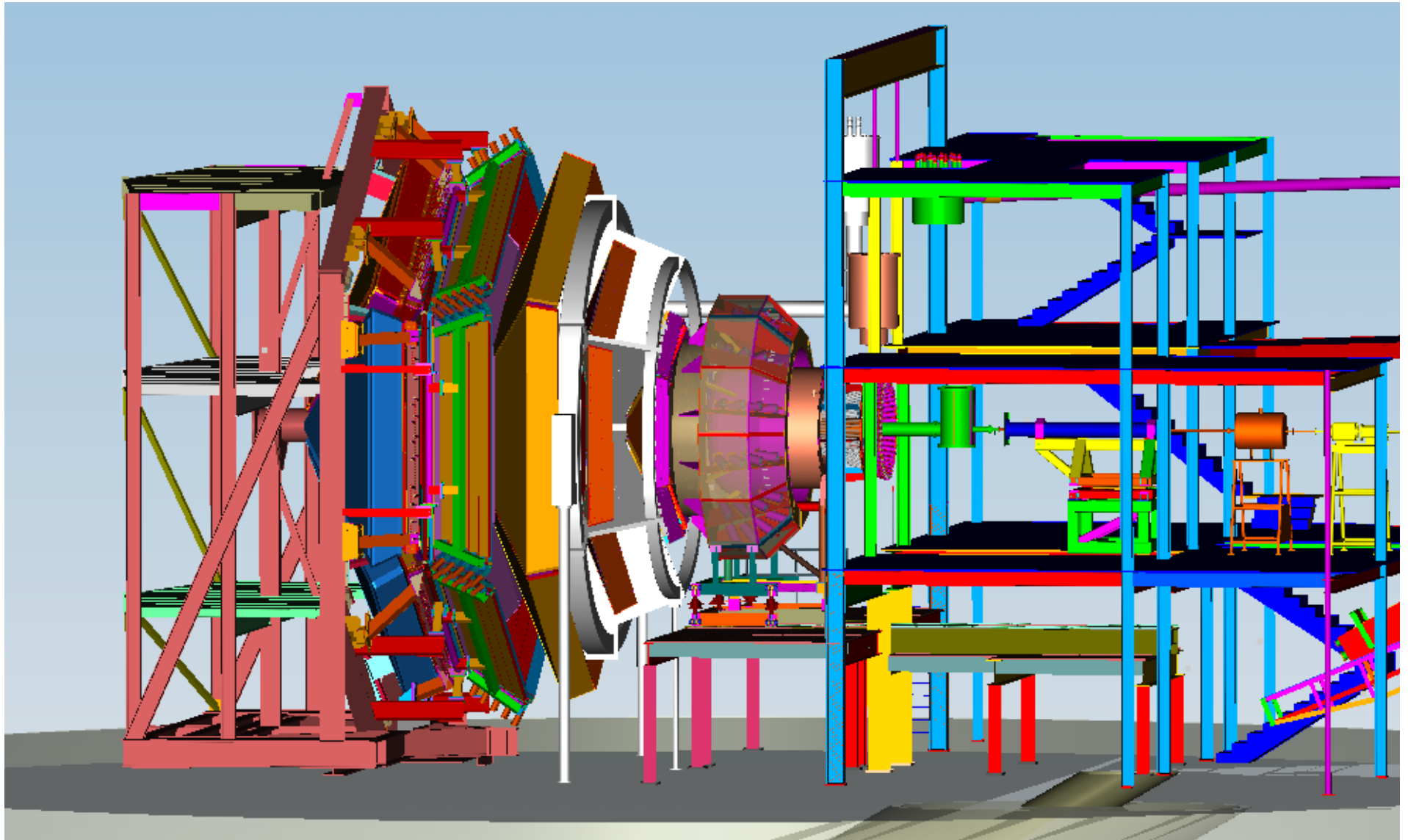


Forward IC and Shielding

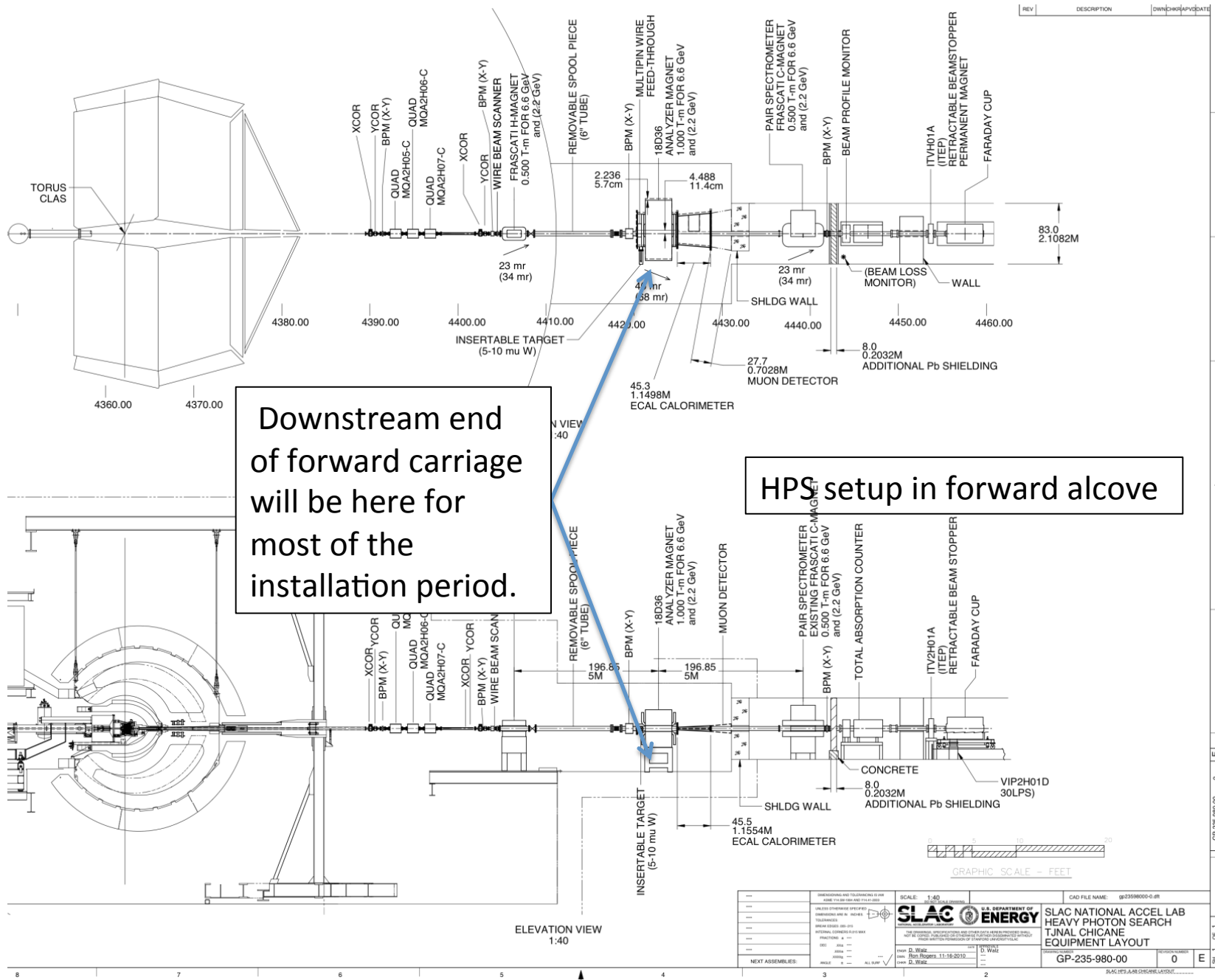
Install Forward
Tagger IC and
detectors if
available



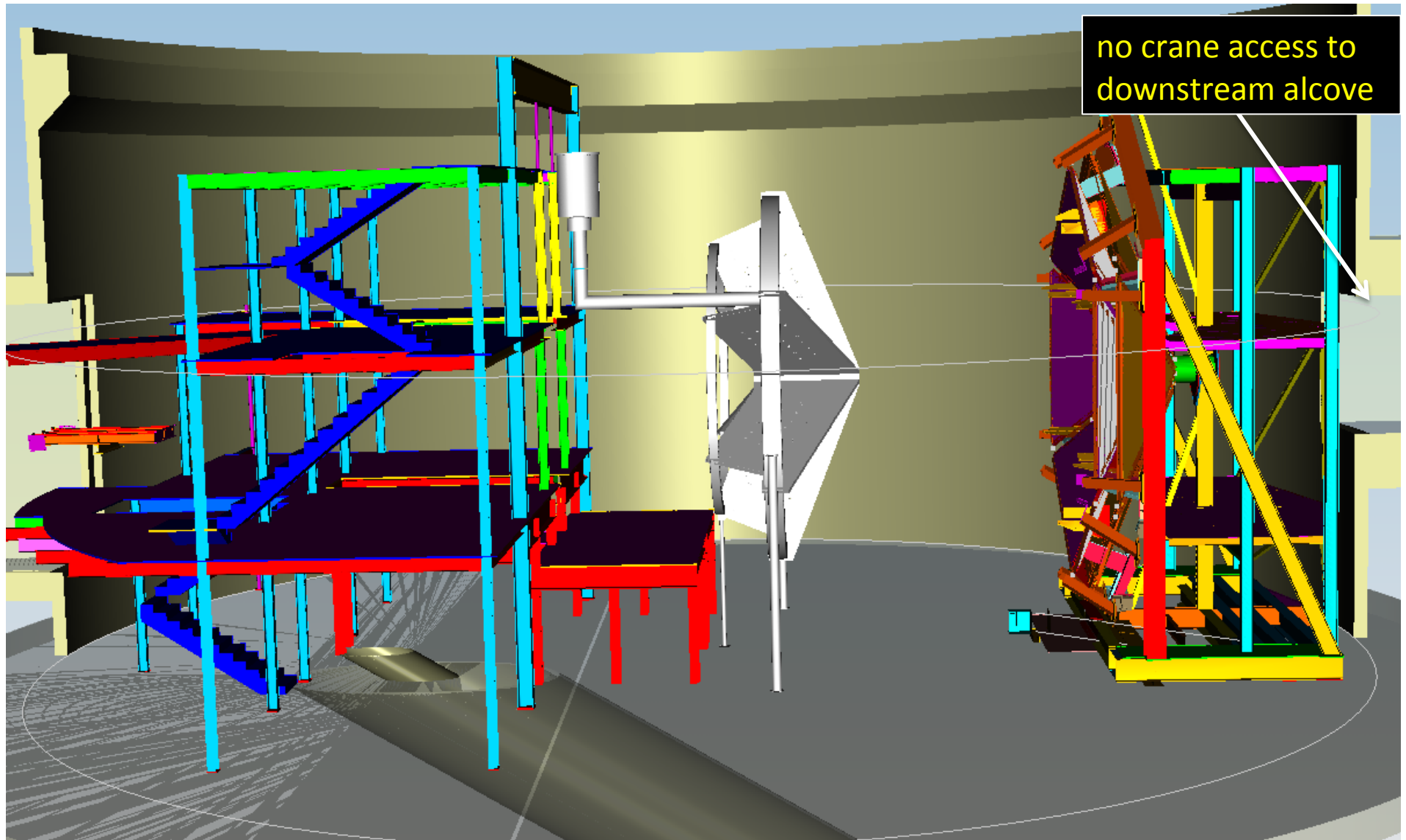
Full *CLAS12* Assembly in Hall B



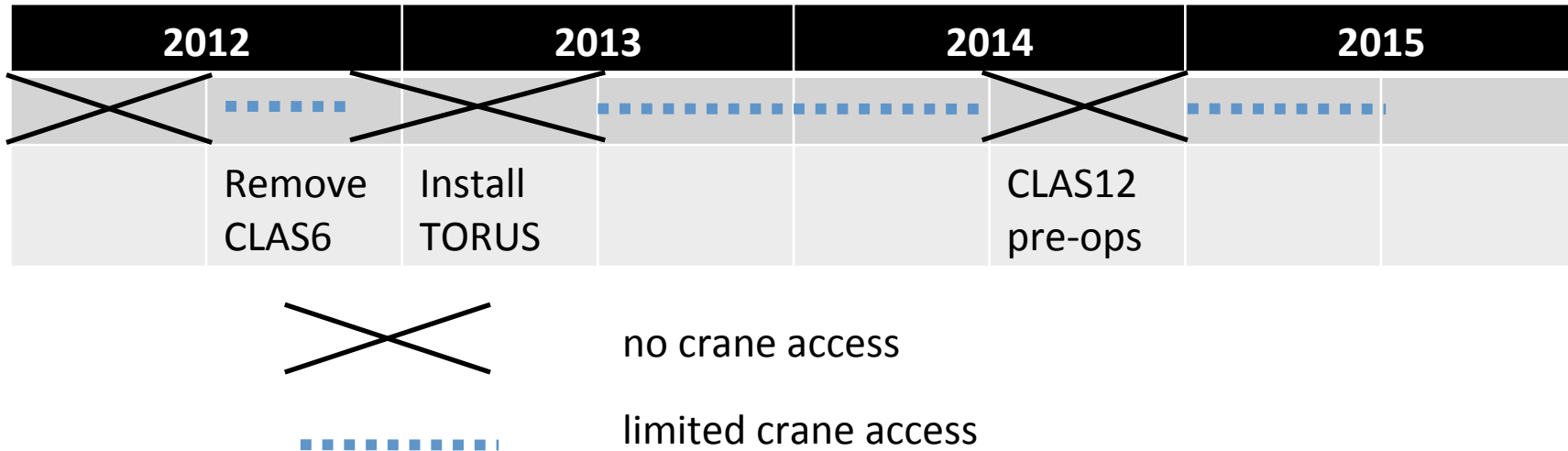
HPS: A proposal to Search for Massive Photons at Jefferson Laboratory



CLAS12 TORUS Assembly and Detector Installation



HPS apparatus in the forward alcove.



- Coordination with CLAS12 installation activity essential
- Need to develop detailed timeline for HPS equipment installation with Hall B work coordinator (Doug Tilles) to incorporate into overall Hall B installation plan.
- Provide 3D CAD model of major HPS components to incorporate into Hall installation procedures.

Comments on HPS installation

- If the HPS apparatus will be installed during CLAS12 installation, there are some constraints.
 - Limited crane access to installation area when magnets or other heavy equipment needs to be moved into the alcove.
 - Requires moving the forward carriage from the retracted position to the operation position and back.
 - Will cause 4 days of interruption in CLAS12 installation every time heavy load needs to be moved => optimize schedule for crane use to minimize interference with CLAS12 installation.
 - Crane access to alcove area can not be provided during the Torus assembly and commissioning period from 11/12-05/13.

Hall B Generic Run Groups

Run Group	PAC days	Run group days	Scheduled days (50%)	Scheduled days (60%)
A	30	30	60	50
B	60	60	120	100
C	419	159	318	267
D	112	56	112	93
E	303	125	250	208
F	90	90	180	150
G	206	103	206	172
H	40	40	80	67
I	60	60	120	100
J	180	180	360	300
Total (w/ HPS)	1,320 (1,500)	723 (903)	1,426 (1,786)	1,207 (1,507)

Generic run schedule ^{*)} (for illustration only)

		2016	2017	2018	2019	2020	2021	2022	2023	2024
Group	Days	118	178	178	178	178	178	178	178	178
A	60	—								
B	120	—	—							
C	320		—	—	—					
D	112				—					
E	250				—	—				
F	180						—	—		
G	206							—	—	
H	80								—	
I	120									—
J	360		---	---	---	---				

^{*)} Based on 50% overall efficiency (= DAQ in Hall B/elapsed time)

Generic run schedule ^{*)} (for illustration only)

		2016	2017	2018	2019	2020	2021	2022	2023	2024
Group	Days	118	178	178	178	178	178	178	178	178
A	50	—								
B	100		—							
C	266			—						
D	92				—					
E	212					—				
F	150						—			
G	170							—		
H	68								—	
I	100									—
J	300									—

^{*)} Based on 60% overall efficiency (= DAQ in Hall B/elapsed time)

Can we increase data taking efficiency?

- Full simulation of experiment before turn on
- Run preparation
- Minimize beam tuning time
- Reduce overhead during run execution
- Online data processing to detect problems early on
- Eliminate DAQ dead time (15% with CLAS6)
- Establish experiment commissioning team

Implementation of such measures might result in an overall increase in efficiency to 60%.

Hall B requirements for new experiments before firm scheduling

- Hall B Safety Review
- Hall B readiness review before begin of installation and before firm scheduling
 - Demonstrated high probability for successful completion of experimental data taking including full simulation of experimental condition addressing
 - electromagnetic background conditions, is required shielding optimally designed
 - potential radiation damage of equipment
 - where possible comparison of simulation to data taken prior to planned experiment with same or similar setup
 - Demonstrated preparedness of trigger and event selectivity, slow control, magnet power supplies, ...
 - Demonstrated availability of human resources to assure
 - quality control of accumulated data
 - online analysis capabilities during run
 - timely completion of offline analysis and publication

END